

NODE=B010

 $\Delta(1700) \ 3/2^-$

$I(J^P) = \frac{3}{2}(\frac{3}{2}^-)$ Status: * * * *

Most of the results published before 1975 were last included in our 1982 edition, Physics Letters **111B** 1 (1982). Some further obsolete results published before 1984 were last included in our 2006 edition, Journal of Physics, G **33** 1 (2006).

NODE=B010

 $\Delta(1700)$ BREIT-WIGNER MASS

NODE=B010M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1670 to 1750 (≈ 1700) OUR ESTIMATE			
1715 $^{+30}_{-15}$	ANISOVICH	12A	DPWA Multichannel
1695.0 \pm 1.3	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
1710 \pm 30	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
1680 \pm 70	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1691 \pm 4	SHRESTHA	12A	DPWA Multichannel
1780 \pm 40	ANISOVICH	10	DPWA Multichannel
1790 \pm 30	HORN	08A	DPWA Multichannel
1770 \pm 40	THOMA	08	DPWA Multichannel
1687.9 \pm 2.5	ARNDT	04	DPWA $\pi N \rightarrow \pi N, \eta N$
1678 \pm 1	PENNER	02C	DPWA Multichannel
1732 \pm 23	VRANA	00	DPWA Multichannel
1690 \pm 15	ARNDT	96	IPWA $\gamma N \rightarrow \pi N$
1680	ARNDT	95	IPWA $\pi N \rightarrow N\pi$
1655	LI	93	IPWA $\gamma N \rightarrow \pi N$
1762 \pm 44	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$
1650	BARNHAM	80	IPWA $\pi N \rightarrow N\pi\pi$
1718.4 $^{+13.1}_{-13.0}$	¹ CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$
1600	² LONGACRE	77	IPWA $\pi N \rightarrow N\pi\pi$
1680	³ LONGACRE	75	IPWA $\pi N \rightarrow N\pi\pi$

NODE=B010M

NODE=B010M
→ UNCHECKED ←

 $\Delta(1700)$ BREIT-WIGNER WIDTH

NODE=B010W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
200 to 400 (≈ 300) OUR ESTIMATE			
310 $^{+40}_{-15}$	ANISOVICH	12A	DPWA Multichannel
375.5 \pm 7.0	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
280 \pm 80	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
230 \pm 80	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
248 \pm 9	SHRESTHA	12A	DPWA Multichannel
580 \pm 120	ANISOVICH	10	DPWA Multichannel
580 \pm 60	HORN	08A	DPWA Multichannel
630 \pm 150	THOMA	08	DPWA Multichannel
364.8 \pm 16.6	ARNDT	04	DPWA $\pi N \rightarrow \pi N, \eta N$
606 \pm 15	PENNER	02C	DPWA Multichannel
119 \pm 70	VRANA	00	DPWA Multichannel
285 \pm 20	ARNDT	96	IPWA $\gamma N \rightarrow \pi N$
272	ARNDT	95	IPWA $\pi N \rightarrow N\pi$
348	LI	93	IPWA $\gamma N \rightarrow \pi N$
600 \pm 250	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$
160	BARNHAM	80	IPWA $\pi N \rightarrow N\pi\pi$
193.3 \pm 26.0	¹ CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$
200	² LONGACRE	77	IPWA $\pi N \rightarrow N\pi\pi$
240	³ LONGACRE	75	IPWA $\pi N \rightarrow N\pi\pi$

NODE=B010W

NODE=B010W
→ UNCHECKED ←

$\Delta(1700)$ POLE POSITION**REAL PART**

VALUE (MeV)

1620 to 1680 (≈ 1650) OUR ESTIMATE

		DOCUMENT ID	TECN	COMMENT
1680 \pm 10	ANISOVICH	12A	DPWA	Multichannel
1632	ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
1651	⁴ HOEHLER	93	SPED	$\pi N \rightarrow \pi N$
1675 \pm 25	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1656	SHRESTHA	12A	DPWA	Multichannel
1650 \pm 30	ANISOVICH	10	DPWA	Multichannel
1640 \pm 25	HORN	08A	DPWA	Multichannel
1610 \pm 35	THOMA	08	DPWA	Multichannel
1617	ARNDT	04	DPWA	$\pi N \rightarrow \pi N, \eta N$
1726	VRANA	00	DPWA	Multichannel
1655	ARNDT	95	DPWA	$\pi N \rightarrow N\pi$
1646	ARNDT	91	DPWA	$\pi N \rightarrow \pi N$ Soln SM90
1681 or 1672	⁵ LONGACRE	78	IPWA	$\pi N \rightarrow N\pi\pi$
1600 or 1594	² LONGACRE	77	IPWA	$\pi N \rightarrow N\pi\pi$

-2xIMAGINARY PART

VALUE (MeV)

160 to 300 (≈ 230) OUR ESTIMATE

		DOCUMENT ID	TECN	COMMENT
305 \pm 15	ANISOVICH	12A	DPWA	Multichannel
253	ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
159	⁴ HOEHLER	93	SPED	$\pi N \rightarrow \pi N$
220 \pm 40	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
226	SHRESTHA	12A	DPWA	Multichannel
275 \pm 35	ANISOVICH	10	DPWA	Multichannel
325 \pm 35	HORN	08A	DPWA	Multichannel
320 \pm 60	THOMA	08	DPWA	Multichannel
226	ARNDT	04	DPWA	$\pi N \rightarrow \pi N, \eta N$
118	VRANA	00	DPWA	Multichannel
242	ARNDT	95	DPWA	$\pi N \rightarrow N\pi$
208	ARNDT	91	DPWA	$\pi N \rightarrow \pi N$ Soln SM90
245 or 241	⁵ LONGACRE	78	IPWA	$\pi N \rightarrow N\pi\pi$
208 or 201	² LONGACRE	77	IPWA	$\pi N \rightarrow N\pi\pi$

 $\Delta(1700)$ ELASTIC POLE RESIDUE**MODULUS $|r|$**

VALUE (MeV)

		DOCUMENT ID	TECN	COMMENT
42 \pm 7	ANISOVICH	12A	DPWA	Multichannel
18	ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
10	HOEHLER	93	SPED	$\pi N \rightarrow \pi N$
13 \pm 3	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
16	ARNDT	04	DPWA	$\pi N \rightarrow \pi N, \eta N$
16	ARNDT	95	DPWA	$\pi N \rightarrow N\pi$
13	ARNDT	91	DPWA	$\pi N \rightarrow \pi N$ Soln SM90

PHASE θ

VALUE (°)

		DOCUMENT ID	TECN	COMMENT
- 3 \pm 15	ANISOVICH	12A	DPWA	Multichannel
- 40	ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
- 20 \pm 25	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
- 47	ARNDT	04	DPWA	$\pi N \rightarrow \pi N, \eta N$
- 12	ARNDT	95	DPWA	$\pi N \rightarrow N\pi$
- 22	ARNDT	91	DPWA	$\pi N \rightarrow \pi N$ Soln SM90

NODE=B010215

NODE=B010RE

NODE=B010RE

→ UNCHECKED ←

NODE=B010IM

NODE=B010IM

→ UNCHECKED ←

NODE=B010220

NODE=B010RER

NODE=B010RER

NODE=B010IMR

NODE=B010IMR

$\Delta(1700)$ INELASTIC POLE RESIDUE

The "normalized residue" is the residue divided by $\Gamma_{pole}/2$.

Normalized residue in $N\pi \rightarrow \Delta(1700) \rightarrow \Delta\eta$

MODULUS (%)	PHASE (°)	DOCUMENT ID	TECN	COMMENT
12±3	-60 ± 15	ANISOVICH	12A	DPWA Multichannel

$\Delta(1700)$ DECAY MODES

The following branching fractions are our estimates, not fits or averages.

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 N\pi$	10–20 %
$\Gamma_2 \Sigma K$	
$\Gamma_3 N\pi\pi$	80–90 %
$\Gamma_4 \Delta\pi$	30–60 %
$\Gamma_5 \Delta(1232)\pi$, S-wave	25–50 %
$\Gamma_6 \Delta(1232)\pi$, D-wave	5–15 %
$\Gamma_7 N\rho$	30–55 %
$\Gamma_8 N\rho$, S=1/2, D-wave	
$\Gamma_9 N\rho$, S=3/2, S-wave	5–20 %
$\Gamma_{10} N\rho$, S=3/2, D-wave	
$\Gamma_{11} N(1535)\pi$	
$\Gamma_{12} \Delta(1232)\eta$	(5.0±2.0) %
$\Gamma_{13} N\gamma$	0.22–0.60 %
$\Gamma_{14} N\gamma$, helicity=1/2	0.12–0.30 %
$\Gamma_{15} N\gamma$, helicity=3/2	0.10–0.30 %

$\Delta(1700)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$	Γ_1/Γ
VALUE (%)	
10 to 20 OUR ESTIMATE	
22 ± 4	ANISOVICH 12A DPWA Multichannel
15.6±0.1	ARNDT 06 DPWA $\pi N \rightarrow \pi N, \eta N$
12 ± 3	CUTKOSKY 80 IPWA $\pi N \rightarrow \pi N$
20 ± 3	HOEHLER 79 IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •	
14 ± 1	SHRESTHA 12A DPWA Multichannel
16 ± 7	ANISOVICH 10 DPWA Multichannel
20 ± 7	HORN 08A DPWA Multichannel
15 ± 8	THOMA 08 DPWA Multichannel
15.0±0.1	ARNDT 04 DPWA $\pi N \rightarrow \pi N, \eta N$
14 ± 1	PENNER 02C DPWA Multichannel
5 ± 1	VRANA 00 DPWA Multichannel
16	ARNDT 95 DPWA $\pi N \rightarrow N\pi$
14 ± 6	MANLEY 92 IPWA $\pi N \rightarrow \pi N & N\pi\pi$
16	¹ CHEW 80 BPWA $\pi^+ p \rightarrow \pi^+ p$

Note: Signs of couplings from $\pi N \rightarrow N\pi\pi$ analyses were changed in the 1986 edition to agree with the baryon-first convention; the overall phase ambiguity is resolved by choosing a negative sign for the $\Delta(1620)$ S_{31} coupling to $\Delta(1232)\pi$.

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow \Delta(1700) \rightarrow \Delta(1232)\pi$, S-wave	$(\Gamma_1\Gamma_5)^{1/2}/\Gamma$
VALUE	DOCUMENT ID TECN COMMENT
+0.21 to +0.29 OUR ESTIMATE	
+0.18±0.04	BARNHAM 80 IPWA $\pi N \rightarrow N\pi\pi$
+0.30	^{2,6} LONGACRE 77 IPWA $\pi N \rightarrow N\pi\pi$
+0.24	³ LONGACRE 75 IPWA $\pi N \rightarrow N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •	
+0.32±0.06	MANLEY 92 IPWA $\pi N \rightarrow \pi N & N\pi\pi$

NODE=B010240

NODE=B010240

NODE=B010RS1

NODE=B010RS1

NODE=B010225;NODE=B010

NODE=B010

DESIG=1;OUR EST

DESIG=2

DESIG=3;OUR EST

DESIG=181;OUR EST

DESIG=4;OUR EST

DESIG=5;OUR EST

DESIG=182;OUR EST

DESIG=6

DESIG=7;OUR EST

DESIG=8

DESIG=186

DESIG=187

DESIG=185;OUR EST

DESIG=9;OUR EST

DESIG=10;OUR EST

NODE=B010230

NODE=B010R1

NODE=B010R1

→ UNCHECKED ←

NODE=B010310

NODE=B010R3

NODE=B010R3

→ UNCHECKED ←

$\Gamma(\Delta(1232)\pi, S\text{-wave})/\Gamma_{\text{total}}$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
20 ⁺²⁵ ₋₁₃	ANISOVICH	12A	DPWA Multichannel
90± 2	VRANA	00	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
54± 3	SHRESTHA	12A	DPWA Multichannel

 Γ_5/Γ

NODE=B010R10
NODE=B010R10

 $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}} \text{ in } N\pi \rightarrow \Delta(1700) \rightarrow \Delta(1232)\pi, D\text{-wave}$ $(\Gamma_1 \Gamma_6)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
+0.05 to +0.11 OUR ESTIMATE			
0.14±0.04	BARNHAM	80	IPWA $\pi N \rightarrow N\pi\pi$
+0.05	2,6 LONGACRE	77	IPWA $\pi N \rightarrow N\pi\pi$
+0.10	3 LONGACRE	75	IPWA $\pi N \rightarrow N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
+0.08±0.03	MANLEY	92	IPWA $\pi N \rightarrow \pi N \& N\pi\pi$

NODE=B010R4
NODE=B010R4
→ UNCHECKED ←

 $\Gamma(\Delta(1232)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
5 to 15 OUR ESTIMATE			
12 ⁺¹⁴ ₋₇	ANISOVICH	12A	DPWA Multichannel
4± 1	VRANA	00	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1± 1	SHRESTHA	12A	DPWA Multichannel

NODE=B010R9
NODE=B010R9
→ UNCHECKED ←

 $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}} \text{ in } N\pi \rightarrow \Delta(1700) \rightarrow N\rho, S=1/2, D\text{-wave}$ $(\Gamma_1 \Gamma_8)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
+0.17±0.05	BARNHAM	80	IPWA $\pi N \rightarrow N\pi\pi$
±0.11 to ±0.19 OUR ESTIMATE			
+0.04	2,6 LONGACRE	77	IPWA $\pi N \rightarrow N\pi\pi$
-0.30	3 LONGACRE	75	IPWA $\pi N \rightarrow N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
+0.10±0.03	MANLEY	92	IPWA $\pi N \rightarrow \pi N \& N\pi\pi$

NODE=B010R5
NODE=B010R5

 $\Gamma(N\rho, S=3/2, S\text{-wave})/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
1±1	VRANA	00	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
30±3	SHRESTHA	12A	DPWA Multichannel

NODE=B010R8
NODE=B010R8

 $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}} \text{ in } N\pi \rightarrow \Delta(1700) \rightarrow N\rho, S=3/2, D\text{-wave}$ $(\Gamma_1 \Gamma_{10})^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
0.18±0.07	BARNHAM	80	IPWA $\pi N \rightarrow N\pi\pi$

NODE=B010R7
NODE=B010R7

 $\Gamma(N(1535)\pi)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4±2	HORN	08A	DPWA Multichannel

NODE=B010R11
NODE=B010R11

 $\Gamma(\Delta(1232)\eta)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
5±2	ANISOVICH	12A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2±1	HORN	08A	DPWA Multichannel

NODE=B010R12
NODE=B010R12

 $\Gamma(N(1535)\pi)/\Gamma(\Delta(1232)\eta)$ Γ_{11}/Γ_{12}

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.67	KASHEVAROV 09	CBAL	$\gamma p \rightarrow p\pi^0\eta$

NODE=B010R13
NODE=B010R13

$\Delta(1700)$ PHOTON DECAY AMPLITUDES

Papers on γN amplitudes predating 1981 may be found in our 2006 edition,
Journal of Physics, G **33** 1 (2006).

$\Delta(1700) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE (GeV $^{-1/2}$)	DOCUMENT ID	TECN	COMMENT
+0.104±0.015 OUR ESTIMATE			
0.160±0.020	ANISOVICH	12A	DPWA Multichannel
0.105±0.005	WORKMAN	12A	DPWA $\gamma N \rightarrow N\pi$
0.125±0.003	DUGGER	07	DPWA $\gamma N \rightarrow \pi N$
0.111±0.017	CRAWFORD	83	IPWA $\gamma N \rightarrow \pi N$
0.089±0.033	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.058±0.010	SHRESTHA	12A	DPWA Multichannel
0.160±0.045	ANISOVICH	10	DPWA Multichannel
0.160±0.040	HORN	08A	DPWA Multichannel
0.226	DRECHSEL	07	DPWA $\gamma N \rightarrow \pi N$
0.096	PENNER	02D	DPWA Multichannel
0.090±0.025	ARNDT	96	IPWA $\gamma N \rightarrow \pi N$
0.121±0.004	LI	93	IPWA $\gamma N \rightarrow \pi N$

$\Delta(1700) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE (GeV $^{-1/2}$)	DOCUMENT ID	TECN	COMMENT
+0.085±0.022 OUR ESTIMATE			
0.165±0.025	ANISOVICH	12A	DPWA Multichannel
0.092±0.004	WORKMAN	12A	DPWA $\gamma N \rightarrow N\pi$
0.105±0.003	DUGGER	07	DPWA $\gamma N \rightarrow \pi N$
0.107±0.015	CRAWFORD	83	IPWA $\gamma N \rightarrow \pi N$
0.060±0.015	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.097±0.008	SHRESTHA	12A	DPWA Multichannel
0.160±0.040	ANISOVICH	10	DPWA Multichannel
0.150±0.030	HORN	08A	DPWA Multichannel
0.210	DRECHSEL	07	DPWA $\gamma N \rightarrow \pi N$
0.154	PENNER	02D	DPWA Multichannel
0.097±0.020	ARNDT	96	IPWA $\gamma N \rightarrow \pi N$
0.115±0.004	LI	93	IPWA $\gamma N \rightarrow \pi N$

$\Delta(1700)$ FOOTNOTES

1 Problems with CHEW 80 are discussed in section 2.1.11 of HOEHLER 83.

2 LONGACRE 77 pole positions are from a search for poles in the unitarized T-matrix; the first (second) value uses, in addition to $\pi N \rightarrow N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis. The other LONGACRE 77 values are from eyeball fits with Breit-Wigner circles to the T-matrix amplitudes.

3 From method II of LONGACRE 75: eyeball fits with Breit-Wigner circles to the T-matrix amplitudes.

4 See HOEHLER 93 for a detailed discussion of the evidence for and the pole parameters of N and Δ resonances as determined from Argand diagrams of πN elastic partial-wave amplitudes and from plots of the speeds with which the amplitudes traverse the diagrams.

5 LONGACRE 78 values are from a search for poles in the unitarized T-matrix. The first (second) value uses, in addition to $\pi N \rightarrow N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis.

6 LONGACRE 77 considers this coupling to be well determined.

$\Delta(1700)$ REFERENCES

For early references, see Physics Letters **111B** 1 (1982).

ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
WORKMAN	12A	PR C86 015202	R. Workman <i>et al.</i>	(GWU)
ANISOVICH	10	EPJ A44 203	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
KASHEVAROV	09	EPJ A42 141	V.L. Kashevarov <i>et al.</i>	(MAMI Crystal Ball/TAPS)
HORN	08A	EPJ A38 173	I. Horn <i>et al.</i>	(CB-ELSA Collab.)
Also		PRL 101 202002	I. Horn <i>et al.</i>	(CB-ELSA Collab.)
THOMA	08	PL B659 87	U. Thoma <i>et al.</i>	(CB-ELSA Collab.)
DRECHSEL	07	EPJ A34 69	D. Drechsel, S.S. Kamalov, L. Tiator	(MAINZ, JINR)
DUGGER	07	PR C76 025211	M. Dugger <i>et al.</i>	(Jefferson Lab CLAS Collab.)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
PDG	06	JPG 33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)
ARNDT	04	PR C69 035213	R.A. Arndt <i>et al.</i>	(GWU, TRIU)
PENNER	02C	PR C66 055211	G. Penner, U. Mosel	(GIES)
PENNER	02D	PR C66 055212	G. Penner, U. Mosel	(GIES)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT+)

NODE=B010235

NODE=B010235

NODE=B010A1

NODE=B010A1

→ UNCHECKED ←

NODE=B010A2

NODE=B010A2

→ UNCHECKED ←

NODE=B010

NODE=B010;LINKAGE=C

NODE=B010;LINKAGE=L7

NODE=B010;LINKAGE=L5

NODE=B010;LINKAGE=H9

NODE=B010;LINKAGE=L8

NODE=B010;LINKAGE=X

NODE=B010

NODE=B010

REFID=54041

REFID=54862

REFID=54335

REFID=53280

REFID=53070

REFID=52706

REFID=52567

REFID=52087

REFID=52105

REFID=52039

REFID=51535

REFID=51004

REFID=49947

REFID=49129

REFID=49130

REFID=47593

ARNDT	96	PR C53 430	R.A. Arndt, I.I. Strakovsky, R.L. Workman	(VPI)	REFID=44675
ARNDT	95	PR C52 2120	R.A. Arndt <i>et al.</i>	(VPI, BRCO)	REFID=44535
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)	REFID=43821
LI	93	PR C47 2759	Z.J. Li <i>et al.</i>	(VPI)	REFID=43327
MANLEY	92	PR D45 4002	D.M. Manley, E.M. Saleski	(KSA) IJP	REFID=41535
Also		PR D30 904	D.M. Manley <i>et al.</i>	(VPI)	REFID=30071
ARNDT	91	PR D43 2131	R.A. Arndt <i>et al.</i>	(VPI, TELE) IJP	REFID=41467
CRAWFORD	83	NP B211 1	R.L. Crawford, W.T. Morton	(GLAS)	REFID=30070
HOEHLER	83	Landolt-Boernstein 1/9B2	G. Hohler	(KARLT)	REFID=31158
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, CIT, CERN)	REFID=41167
AWAJI	81	Bonn Conf. 352	N. Awaji, R. Kajikawa	(NAGO)	REFID=30067
Also		NP B197 365	K. Fujii <i>et al.</i>	(NAGO)	REFID=30068
BARNHAM	80	NP B168 243	K.W.J. Barnham <i>et al.</i>	(LOIC)	REFID=31072
CHEW	80	Toronto Conf. 123	D.M. Chew	(LBL) IJP	REFID=31151
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP	REFID=30064
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP	REFID=40096
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP	REFID=30058
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP	REFID=30859
LONGACRE	78	PR D17 1795	R.S. Longacre <i>et al.</i>	(LBL, SLAC)	REFID=30054
LONGACRE	77	NP B122 493	R.S. Longacre, J. Dolbeau	(SACL) IJP	REFID=30051
Also		NP B108 365	J. Dolbeau <i>et al.</i>	(SACL) IJP	REFID=30052
LONGACRE	75	PL 55B 415	R.S. Longacre <i>et al.</i>	(LBL, SLAC) IJP	REFID=30047
